10-13-1960

Test 774: Case 441: (Gasoline)

Tractor Museum
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NEBRASKA TRACTOR TEST 774 - CASE 441 GASOLINE

(ALSO CASE 470 GASOLINE)

The University of Nebraska Agricultural Experiment Station

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POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cooling med	Temp Degrees F Air wet bulb	Temp Degrees F Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
33.11	1750	2.793	0.525	11.85	185	59	75	28.750
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
29.28	1822	2.671	0.568	10.96	183	60	77	.....
0.00	1939	1.104	....	....	177	59	74	.....
15.06	1873	1.837	0.759	8.20	180	60	75	.....
32.95	1750	2.772	0.524	11.89	185	62	77	.....
7.76	1930	1.466	1.175	5.29	180	60	75	.....
22.41	1861	2.256	0.627	9.93	182	60	75	.....
Av 17.91	1862	2.018	0.701	8.88	181	60	75	28.702

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
29.15	2170	5.04	1749	4.13	2.913	0.622	10.01	184	52	59	28.880
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
23.68	1638	5.42	1851	2.52	2.285	0.601	10.36	181	52	59	28.796
50% of Pull at Maximum Power—Two Hours—3rd Gear											
16.76	1114	5.64	1909	1.58	1.952	0.725	8.59	178	39	40	28.763
MAXIMUM POWER WITH BALLAST											
27.97	4362	2.40	1749	11.66	1st Gear.....			183	44	47	28.945
29.59	2948	3.76	1750	5.93	2nd Gear.....			182	44	47	28.945
29.39	2186	5.04	1750	4.07	3rd Gear.....			183	44	47	28.945
24.52	716	12.84	1754	1.34	4th Gear.....			182	47	52	28.915
MAXIMUM POWER WITHOUT BALLAST											
26.42	2009	4.93	1749	9.31	3rd Gear.....			181	64	74	28.700

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear						
Pounds pull	2200	2350	2500	2600	2550	2450
Horsepower	29.4	28.2	26.7	24.3	21.1	16.3
Miles per hour	5.0	4.5	4.0	3.5	3.1	2.5

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13.6-28;4;14	Two 13.6-28;4;14
Ballast	—Liquid	492 lb each	None
	—Cast iron	781 lb each	None
Front tires	—No, size, ply & psi	Two 5.00-15;4;24	Two 5.00-15;4;24
Ballast	—Liquid	None	None
	—Cast iron	None	None
Height of drawbar		13½ inches	15 inches
Static weight	—Rear	4851 lb	2306 lb
	—Front	1176 lb	1139 lb
Total weight with operator		6202 lb	3620 lb

Department of Agricultural Engineering
Dates of Test: October 13 to October 27, 1960
Manufacturer: J. I. CASE COMPANY, RACINE WISCONSIN
Manufacturer's Power Rating: 34 Belt Horsepower (corrected to standard conditions)

FUEL, OIL and TIME Fuel regular gasoline **Octane No** Motor 84 Research 92 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.7475 **Weight per gallon** 6.223 lb **Oil** SAE 20-20W **API service classification** ML, MM, MS, DG **To motor** 0.945 gal **Drained from motor** 0.861 gal **Transmission and final-drive lubricant** SAE 90 **Type** multi-purpose gear lubricant (E.P.) **Total time engine was operated** 35½ hours.

ENGINE Make Case gasoline **Type** 4 cylinder vertical **Serial No** 278-SO-1323 **Crankshaft mounted** lengthwise **Rated rpm** 1750 **Bore and stroke** 3⅜" x 4⅛" **Compression ratio** 7.1 to 1 **Displacement** 148 cu in **Carburetor size** 1" **Ignition system** battery **Cranking system** 12 volt electric **Lubrication** pressure **Air cleaner** oil washed wire mesh **Oil filter** replaceable paper element **Fuel filter** brass screen **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type tricycle **Serial No** 6150846 **Tread width** rear 48" to 88" front 6¼" to 11½" **Wheel base** 85" **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 39.6" Vertical distance above roadway 32.5" Horizontal distance from center of rear wheel tread 0" to the right/left **Hydraulic control system** direct engine drive with throw out lever **Transmission** selective gear fixed ratio **Advertised speeds mph** first 2.49 second 3.66 third 4.81 fourth 11.88 reverse 2.96 **Clutch** single plate dry disc operated by foot pedal **Brakes** double disc operated by two foot pedals **Steering** no power assistance **Turning radius** (on concrete surface with brake applied) right 94" left 94" (on concrete surface without brake) right 94" left 94" **Turning space diameter** (on concrete surface with brake applied) right 205" left 205" (on concrete surface without brake) right 205" left 205" **Belt pulley** 1190 rpm at 1750 engine rpm diam 10¼" face 6" **Belt speed** 3193 fpm **Power take-off** 533 rpm at 1750 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

We, the undersigned, certify that this is a true and correct report of offcial Tractor Test 774.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
G. W. STEINBRUEGGE
J. J. SULEK
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, ½ the 85% torque; maximum power; ¼ and ¾ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**

Case 441 Gasoline